IN THE

Supreme Court of the United States

JANUARY TERM, 1949

Nos. 7, 8, and 48

THOGER GRONBERG JUNGERSEN,
Petitioner-Respondent,

v.

OSTBY AND BARTON COMPANY, et al.,
Respondents-Petitioners,

and

THOGER GRONBERG JUNGERSEN,
Petitioner,

v.

ROBERT BADEN, ROSE BADEN, ALBERT FOSS, et al., etc.,
Respondents.

MOTION FOR LEAVE TO FILE PETITION FOR RECONSIDERATION

No Counsel.

Respectfully submitted,

T. G. JUNGERSEN.

Summit, N. J.,
January 27, 1949.

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v.

Robert Baden, Rose Baden, Albert Foss, et al., etc.,
Respondents.

Motion for Leave to File Petition for Reconsideration

I, Thoger Gronborg Jungersen, present this my motion for leave to file out of time a petition for reconsideration of my cases Nos. 7, 8, and 48 which were decided by this United States Supreme Court on January 3, 1949 and I respectfully submit:

1. That the motion for reconsideration is not being presented for purposes of delay in any manner whatsoever, as it is in my own interest to get a speedy and just decision.

2. The reason for this late filing is that I was first informed that the period for filing was 30 days after the decision. Then I was informed that the period was 25 days. Now, upon contacting the clerk of this Court, I am told that the period is only 15 days. Due to the fact that I am not an attorney I have depended on information from people who are supposed to know. This was an error on my part which I ask this court to overlook because of the extreme importance of obtaining justice in this case. I have done everything in my power to assemble the information which I believe important for a just decision in this case.

3. Despite my not being acquainted with the legal ethics, manners and forms, and not using counsel, I hope that this appeal for a reconsideration in order to receive justice will be favorably considered.

The Court's definition of what invention is and its interpretation of what may be considered obvious to men skilled in an art will affect the lives and purposes of hundreds of thousands of American inventors. A new movement by inventors and attorneys was organized in New York last year under the name of the AMERICAN INVENTORS ASSOCIATION. I have been chosen as president of this group. Its purpose is to promote clarification of our patent code and to protest the abuses of our present system.

Justices Burton, Frankfurter and Jackson have expressed their awareness of a need for sharper definition in the patent system—as, indeed, did Judges Learned Hand and Meany on the courts below. It is time that a persistent rumor, to the effect that the passage of Chief Justice Taft from the court was also the passage of patents from the American scene, is conclusively answered with an opinion which can be used as a gauge by the patentee. To-day, no man knows whether the secret, which he has entrusted to his government for the public benefit, will be forcibly torn from his possession by an arbitrary shift in judicial policy.

I am positive that I appeal with the manifold voice of our American inventors when I request the Court to speak forth now in the same plain words which have characterized its great decisions of the past. We, who have devoted our professional lives to technology, must know whether we are to continue under a system which fosters free enterprise invention or whether we must prepare for socialization of our art.

Petition for Reconsideration

Cases Nos. 7, 8, and 48.

To the Honorable the Chief Justice and Associate Justices of the Supreme Court of the United States:

On January 3, 1949, the Court held my Letters Patent No. 2,118,468 invalid. I believe that the importance which this case must hold for the inventors whose 145,000 applications now pend in the Patent Office justifies a request for further consideration before final judgment is passed. Also, the Court has, apparently, overlooked the industrial importance of the process covered by the subject patent; an oversight which is confessedly of my own doing in part. At the time this patent became involved in the litigation which led it before our highest Appellate Court, I was refused permission to use what was then classified information, for its defense. These restrictions have recently been removed and I trust that the Court, in the interest of Justice, can see its way clear to set aside any formal barriers which might prevent its perusal of the exhibits which I am submitting with this petition (Exhibits SC-1 to SC-17 inc.). I think that these exhibits speak for themselves and will move the Court to see (if I may paraphrase the Court's own wording) that, in truth, this patent controversy does carry serious consequences for an important industry, and thereby for the general public.

I am confident that every one of the Justices on this high Court will agree and hold every claim in my patent valid when they realize the injustice of this decision and after understanding the true facts in this case concerning the enormous importance the invention has proved to hold for the United States, during the war as well as now in peace.

Mr. Justice Jackson has, I think, struck on the theme of my argument when he said, "and if Benvenuto Cellini's age-old writings are so revealing to us laymen of the appellate Bench, it is hard to see why this practical-minded industry which the Court says was following Cellini failed through all the year to get his message." With the Court's permission, I should like to discuss briefly the background of the case, the actual technics of casting and to spotlight the distinction between the prior art and my invention:

It is hoped that this may cause some of the Justices to wonder if they were correct in accepting the opinion created by Mr. Tour's testimony. Perhaps they should have put more faith in the unbiased, true testimony of General Joseph Robinson. His opinion was completely disregarded by every court. His extensive experience with this method, being in direct charge of it for our government (he was head engineer for the W. P. B), combined with the fact that he is an experienced patent expert and engineer, as well as his having been chosen for his present post as technical judge on the Deconcentration Review Board in Tokyo, Japan, should certainly evaluate his judgment of what is or is not taught by the prior art. When asked for his opinion as to the relation between Kralund and the Jungersen Process he stated, "I do not see any." He then stated his reason (R. 173) "The Kralund patent in my opinion begins as a die casting patent and ends as a die casting patent, it does not teach anything else." He then goes on, "As I read Kralund he teaches nothing else. That was his sole purpose, his sole aim."

In contradiction to Mr. Tour's testimony, I obtained a sworn affidavit from the vice-president of Doehler, proving that even Doehler Die Casting Company, where the Kralund method was born, never used it commercially, but abandoned it long before the Kralund patent was even issued.

It is a fact that they did not teach anyone in any industry any process which could produce the intricate castings made possible by my method. My opponent might argue that if they did use the knowledge and teachings of the combined art which was cited against me they would have the method which I claimed in my patent. To an unskilled person it might look that way, if he did not realize the finer points about what is and is not taught by these references. The fact is that, if we took all the knowledge of the cited prior art and assembled it in a process, it would not produce castings comparable to those already known in industry and produced by much simpler means.

My method has completely revolutionized our conception of what we called castings. It produced an entirely new product: a casting which could not previously be produced by any known method. It filled the gap between the very finest castings which had been available before and the finished machined product—something that casters and machine shops or jewelers combined had been trying to do. It can produce their finished product by casting alone. This is why all industries using intricate metal parts have adopted it as one of their most important production methods.

In the jewelry industry, for example, small castings of rings as they were made before had to be filed and hand-worked all over. Now, many rings and other jewelry items are cast finished and require no hand work other than the removal of the gates. This results in an entirely new product which could not be produced by any previous method.

In other industries this is even more important. We seldom tried to make castings of small parts. We generally fabricated them from bar stock or assembled them from small stamped parts. Here again we have now combined the work of casters and machinists into one new

method, producing an entirely new product: the finished part. This is often done at ridiculously low cost compared to the most economical methods used before. (Cf. Exhibits SC-9, SC-10, SC-11.)

Reading the testimony, opinions and references in the lower court cases, anyone not knowing the truth will get an entirely wrong opinion about the facts. The different findings of fact and opinions came from or were derived from the understanding created by Mr. Sam Tour's testimony and his definition of words like obvious, large, small, perfect, etc., and, as a consequence of his interpretation, various courts have picked words or sentences from references or statements that they did not understand the true meaning of and put them together in well-sounding opinions. The impressions which everyone would get from reading the case (particularly Tour's misleading testimony) and the actual truths are set forth below. I believe it necessary to mention only a few examples:

Impression: 1. That this case is only concerned with jewelry casting and is of no national importance.

True Fact: 1. It has proved to be one of the most important production methods wherever intricate parts are used in all industries for peace and war.

Impression: 2. That the Kralund patent was a new and most important reference overlooked by the patent office.

True Fact: 2. As correctly stated by General Joseph Robinson, an experienced patent expert and engineer, when asked for his opinion about the relation between Kralund's and Jungersen's processes, "I do not see any", and he went on to amplify his statement (R. 173). Kralund did not

enrich the art of making intricate castings. Even Doehler Die Casting Company, where the Kralund method was born, discarded it as being impractical long before the patent was issued in 1917. See Exhibit No. SC-1 Mr. Pack's affidavit. We did not need Kralund to prove that a mold could be filled with wax by pressure. We all knew that, but no one ever used it in a practical combination of steps such as mine, although this knowledge has been available ever since castings were first made.

Impression: 3. That Sam Tour, the expert in this case, had worked with Doehler Die Casting Company where he had many years experience with the Kralund process.

True Fact: 3. A sworn affidavit from Mr. Charles Pack, vice president of Doehler Die Casting Co., and under whose direct supervision Mr. Tour worked during his stay there from 1921 to 1928 is to the effect that after unsuccessful experiments had been conducted and the Kralund method was found to be impractical and inaccurate, it was abandoned, even before the patent was issued in 1917. Not one casting made by that method was ever sold. The method has never been used by Doehler since 1916. This is pretty strong evidence against Tour from a reputable officer of Doehler and given after he had read Tour's testimony and realized the importance of his statements.

Impression: 4. That, as Judge Rifkind found in his opinion (R. No. 32), "While it is un-

questionably true that Kralund was directing his efforts towards the more exacting requirements of precision tool castings." This he mistakenly might have thought to come within the scope of my claims 5 and 6.

True Fact: 4. When Tour referred to his many years experience with precision casting, in an attempt to make the court believe that he had worked with it ever since he joined Doehler, he was just exaggerating. Tour's first work with precision casting was, no doubt, during his work with Frankfort Arsenal in Philadelphia from 1940 to 1943, where he received highly secret information and instruction in the use of my method. See Exhibits Nos. SC-5, SC-6 SC-7, SC-8. The knowledge gained from this secret information about my method was then used against my own patent in court.

Impression: 5. And the fact that Kralund did not mention how his mold was made made no difference because it was common practice at Doehler's to make the molds from drawings or around the model as I taught it.

True Fact: 5. During visits to Doehler Die Casting Co., the world's largest producer of die castings, I questioned a number of the leading people in their production department and tool makers and I failed to find anyone who had ever heard of or seen any die casting dies which had been formed around a model. (Cf. Exhibits SC-2, 3 and 4.)

Any court having this or similar understandings must be in doubt about the value or importance of my contribution to science and industry. In my opinion Tour has given either false testimony or testimony so misleading that it makes no difference; in both cases it accomplished obstruction of justice.

Let us now take a look at the methods which were known, and we shall see exactly where my broadest claim differs from the old art referred to. It was known to make a mold around a model and cast wax into it by gravity and to invest the wax pattern to form a secondary casting mold. This method no doubt is excellent for the purpose for which it has been used, it produced what seemed perfect castings to those who did not know any better, but when it comes to small intricate castings it just cannot be used. When these small molds made around an intricate pattern could not be filled by gravity the old casters gave up. This is where the old art stopped and mine began. I discovered that when I used an applied force to fill even the most intricate details of my primary mold I could produce any number of the most delicate patterns in wax; this no one had ever done before. In some cases centrifugal force is the only practical force to use for filling the mold, for example on rubber molds for jewelry. In other cases, as where metal molds are involved, a hydraulic force is to be preferred. Kralund, on the other hand, teaches a method which shows how to save his expensive dies; he does not teach how to do intricate work; he does not make his mold around a model and, further, the process was only an abandoned, impractical experiment.

The art of wax casting, prior to my invention, had achieved methods which made feasible the production of objects ranging from Cellini's celebrated "Perseus with the Head of Medusa" to prosaic articles of commerce. What the casters had not been able to do was pass a roughly-defined boundary of complexity and minuteness.

Kralund, a recognized authority, had taught, in the patent upon which my opponents placed such heavy reliance, that, "the method, however, is not particularly adaptable to the production of small castings by reason of the relatively greater expense as compared with a pressure die casting." When he is faced with small castings, he turns to die casting because his process entails the hand-cutting from steel of a concave die into which he can cast his final metal. What then is the purpose or use of his much-discussed patent? This he sets forth in the patent itself, "The primary object of the invention is to produce such castings under conditions whereby the mold or die will not be injuriously affected by the shrinkage, or by the temperatures of the metal." Mr. Charles F. Pack, an outstanding casting authority and close associate of the late John Kralund has explained the process in detail (Exhibit SC-1).

La Gravure, Haseltine and Spencer et al. were certainly advanced to the stage where they could make fairly small, but not intricate (in the precision casting sense) castings. The numerous vents which were employed by the old casters are taught by Spencer's patent, "After the mold is removed from the pattern it should have any number of small vent holes pierced through it that may be found necessary to allow for the escape of air * * * etc." Wherever one of these vents was used, a projection would appear on the casting; each of these protusions had to be machined off. These old casters were not able to pass beyond the boundary into really small castings because they did not use any force other than gravity to cast their wax.

To finish this summary of the most pertinent prior art, there is the manufacture of cast fillings in dentistry. This advanced technique does, in fact, approach closer to my method and, when the patent application was under consideration, was weighed, at my request, by the Examiner and Division Chief with great care. They concluded that it was not anticipatory for several reasons—two of which

are most pertinent here. One is that the mold (cavity) in the tooth is not formed around a model (the same argument which disposes of Kralund's alleged anticipation) and the other that a dental casting is not intended to exactly fit the tooth cavity. It is embedded in a layer of cement which allows considerable latitude of contour and it must not have any projections which would prevent its insertion into the tooth. The only reason a dentist uses wax and investment at all is because he cannot painlessly pour molten gold into his patient's cavity. His adoption of lost wax methods is thus motivated by similar reasons to those of Kralund who was trying to protect his steel dies from metallurgical damage. McManus, whose centrifugal casting machine was designed for dental use, has expressed a belief that his patents were erroneously employed in this case. (Cf. Exhibit SC-12.)

It seems odd to me to have my various claims thrown together and rejected on the cited art, particularly, as is stated elsewhere, the cited art does not teach the broad steps of my method of casting. That the rejection is baseless, I have pointed out schematically on pages 18-23 incl. and summarize here below.

Claims 1 & 3: Have three essential steps. Only one is used by Spencer, Haseltine, La Gravure and Cellini (?). The other two are not used by any of the cited arts.

Claims 2 & 4: Four essential steps. Only one of these is used by the combined art and another by Spencer, Haseltine and La Gravure. The other two are not used by any of the cited arts.

Claims 5 & 6: Three steps. The first used by all except Kralund. One is used only by Kralund. The remaining one is not used in any of the cited arts.

We have now reached a point where it is easy to explain what my process is: It is a lost wax process, intended for use in the casting of objects small and/or intricate to a degree which does not permit the introduction of wax into a mold by gravity. It has three vital steps, (1) Forming a plastic mold around a model, (2) Filling the mold with wax by an applied force, (3) Investing the wax pattern to form a secondary casting mold. Its other steps are ordinary in the art. Each of its three vital steps are admittedly old. Their combination in that order is new. And thereon hangs my basic argument.

This then was the condition in which I found the art of lost wax casting in 1933 and this is the invention which I conceived and patented. It is a process compounded of elements selected by trial and error from prior art—as, in fact, what invention is not? With no intention of measuring my stature against his, I should like to remind the Court of Thomas Edison's classic victory—the incandescent lamp. Electric light had been known and employed before Edison. Pioneers all over the world were working to make it a practical adjunct to living instead of the experimental curiosity which it then was. Every schoolchild learns that Edison succeeded, not by philosophical contemplation, but doggedly trying every known element until he found that unique combination of a carbonized filament and an evacuated chamber which to-day lights the world. It was not long thereafter that an eager industry developed improvements: the substitution of inert gas for the vacuum, tungsten for carbonized filament, frosting for clear glass. Was Edison's device no invention then because the work of physicists with vacuum and chemists with carbonization had anticipated him? Was he bound by prior knowledge of the elements which he assembled with such laborious genius?

It would seem self-evident that, while an art probably always contains all the elements which constitute the sub-

stance of its improvements, when many talented men for many years have attempted to fit together the jigsaw puzzle of man's knowledge into a new and enriching picture, it is superficial argument to contend that nothing has been accomplished because the completed picture plainly reveals the outlines of its component sections.

This Court will undoubtedly realize its error in finding that my invention was merely a collection of anticipated steps, and that my combination of steps was, in its essential features, well-known in the art. Fact and history have proved that the Court erred. Most intelligent people are apt to take things for granted. They honestly feel that if they grasp a new idea quickly it certainly must have been obvious to those people who work in that field every day. Often this is a mistake.

Respectfully submitted,

THOGER G. JUNGERSEN,
Petitioner.

Summit, N. J.
January 28, 1949.

History

A brief history of my experience may be helpful to the Court in realizing why extreme interest has been centered on destroying this patent.

I have spent all my life developing new and useful things for civilization. Some of my inventions have been most important to humanity, such as the reflectors used on all our highways today. They have saved untold thousands of lives.

When our government called for inventions for defense use and the Inventors Council opened its doors in the Patent Office August 16, 1940, I was the first person there. Mr. Kettering, however, being head of the Council had the first case and I am told mine was number two. I offered all my patents, as well as the time of my son and myself, free of charge to the government, for the duration of the imminent war. One thing I offered them was a secret method of night vision, another the process involved in this case (cf. Exhibits SC-13, 14). In the beginning (about 1938-9), no one in Washington would listen to my argument for the importance of this method to defense. I spent thousands of dollars redesigning and casting intricate instrument parts to prove its importance. That did it. Beginning about 1941-2, the larger firms, such as Allis-Chalmers, Westinghouse, General Electric, Union Carbide, Haynes Stellite, International Nickel, and others started casting by my method. When I approached General Electric and offered them a license their answer was that they were not interested (cf. Exhibit 15). Instead, Mr. Groner (whose firm is patent counsel to General Electric) showed up in Washington to have my precision casting patents set aside in the interest of the country—or, more properly, in his clients' interest. General Joseph Robinson, now on the Deconcentration Review Board in Tokyo, Japan, and at that time Head Engineer of the Research and Development Division of the War Production Board, rejected Mr.

Groner's request. General Robinson later stated that this invention was the most important new production method that the government had during the recent war. We made millions of intricate castings that were either impractical or impossible to make by any other means. Due to my further improvements in the method, I had made it possible to cast even the highest-fusing metals—such as were necessary to make turbine blades for gas turbines and for the development of jet engines. The method is taught in U. S. Patent No. 2,200,449 (Exhibit SC-16), a continuation in part of the patent here in suit. These metals were considered impossible to cast into intricate shapes before and the alloys that were wanted could not be fabricated by any other method.

The government issued numerous secret instructions on my method of casting to help in the production techniques of many large plants which were set up for this specific method. I am enclosing copies of a few of these papers (Cf. Exhibits SC-5-12 incl.). These will prove without doubt that this method is as important as I represent.

I believe Mr. Justice Reed has either misunderstood the technical matters set forth herein or employs extremely harsh standards for the measurement of invention. If his criteria for judging the obvious or not obvious are the law, then I request that the Court immediately issue a ruling forbidding exploitation of United States citizens by the Patent Office. There is little difference between passing a worthless check and passing a worthless government document for value received. There are, at present 145,000 patent applications on file; I have submitted about 20 of these. All these applications were made by inventors who expect to be treated fairly and in accordance with their constitutional rights. Of these applications, about 40,000 will be issued as patents this year. If the standards guiding their issue are not the same as those by which they are later to be judged, there is no question in my mind

that the United States Government is operating a gigantic fraud—our Patent Office.

It is clear that mistakes can occur and should be corrected through our courts, but when every one of the 40,000 patents to be issued this year can look forward to judgment by standards such as these, I believe the situation to be nothing short of fraud. The standards by which we evaluate a patent when tried in court must either make common sense, or our standards for issuing a patent must anticipate the ingenuity of the judges who later evaluate it. Very few inventors will be able to live up to such standards. Many may seek protection for their ideas from some other government when they realize that they have paid out this year approximately $14,000,000.00 in cold cash (apart from developmental costs) and received worthless government documents in the most gigantic swindle the world has ever known. I, for one, have been approached three times by a committee of Russian scientists visiting this country for the express purpose of interesting scientists and inventors in coming to the Soviets to help build their industry. Although promised the life of a king in Russia, I chose to work for what I thought was right in the United States. This country has proved to the world that its great industry was erected on free enterprise technology and that it depends upon the same system for its continued leadership in peace and war. Our courts seem to have forgotten this fact. Invention must be encouraged and protected in order to maintain prosperity, continue leadership in industry, employ all our labor and maintain our high living standard.

No Counsel.

Respectfully submitted,

T. G. JUNGERSEN.

Summit, N. J.,
January 27, 1949.

Claim 1:

A method of casting articles of jewelry of intricate design consisting in first producing a model of the article to be cast, (1) **then forming about said model a primary mould of a plastic material which will retain a lasting shape through subsequent treatment,** then removing the model from the primary mould, (2) **then by centrifugal action forcing into the primary mould molten wax or other material of a low fusing point that will not injure the primary mould to form a pattern,** (3) **and employing the patterns so made for the manufacture of casting moulds.**

Essential Steps	Kralund	Cellini	Spencer	Haseltine	La Gravure
1	No	?	√	√	√
2	No	No	No	No	No
3	No	No	No	No	No

Claim 2:

A method of casting articles of jewelry of intricate design consisting in, first making a model of the article desired to be cast, (1) **then forming a primary mould in separable sections there-around of plastic material capable of assuming intimate contact with the intricate designs of the model and adapted to retain the assumed shape,** then removing

Essential Steps	Kralund	Cellini	Spencer	Haseltine	La Gravure
1	No	No	√	√	√
2	No	No	No	No	No
3	√	√	√	√	√
4	No	No	No	No	No

the model, (2) **then by centrifugal force projecting into the mould cavity and completely filling same with a molten material of a low fusing point which will not injure the mould,** then removing the fusible pattern so cast, (3) **then investing said pattern in a refractory material which will assume all the contours of its intricate design to form a secondary mould,** then heat treating said investment removing the low fusing pattern therefrom, (4) **then by centrifugal force projecting molten metal into the heat treated mould,** and finally removing said mould from the cast article.

Claim 3:

A method of casting articles of jewelry of intricate design consisting in first producing a model of the article to be cast, (1) **then forming about said model a primary mould of a plastic material which will retain a lasting shape through subsequent treatment,** then removing the model from the primary mould, (2) **then by centrifugal action forcing into the primary mould molten wax**

Essential Steps	Kralund	Cellini	Spencer	Haseltine	La Gravure
1	No	?	√	√	√
2	No	No	No	No	No
3	No	No	No	No	No

or other material of a low fusing point that will not injure the primary mould to form a pattern, (3) and employing the patterns so made for the manufacture of casting moulds, (4) a method of casting articles of jewelry as claimed in claim 1 in which the plastic material of which the primary mould is formed is treated to retain its assumed shape and after such treatment remains flexible and is flexed in the act of removing the model to withdraw the mould material from the intricacies of the model.

Claim 4:

A method of casting articles of jewelry of intricate design consisting in, first making a model of the article desired to be cast, (1) **then forming a primary mould in separable sections there-around of plastic material capable of assuming intimate contact with the intricate designs of the model and adapted to retain the assumed shape,** then removing the model, (2) **then by centrifugal force projecting into the mould cavity and completely filling same with a**

Essential Steps	Kralund	Cellini	Spencer	Haseltine	La Gravure
1	No	No	√	√	√
2	No	No	No	No	No
3	√	√	√	√	√
4	No	No	No	No	No
5	?	No	No	No	No

molten material of a low fusing point which will not injure the mould, then removing the fusible pattern so cast, (3) **then investing said pattern in a refractory material which will assume all the contours of its intricate design to form a secondary mould,** then heat treating said investment removing the low fusing pattern therefrom, (4) **then by centrifugal force projecting molten metal into the heat treated mould,** and finally removing said mould from the cast article, (5) **a method of casting articles of jewelry as claimed in claim 2 in which the pattern formed by projecting the pattern material into the primary mould under applied force and thereby provided with a surface free from imperfections is invested with a fluid coating of a finely ground refractory material,** said refractory material being built up to a thickness sufficient to withstand the stresses to be applied by forcing molten metal thereinto to form the article to be produced.

Claim 5:

A method of casting an article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions, comprising first producing a model of the article to be cast, (1) **then forming about said model a primary mould,** then removing the model from the primary mould, (2) **then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould molten wax or other material of low fusing point that will not injure the primary mould to form a pattern,** (3) **and employing the patterns so made for the manufacture of a casting mould.**

Essential Steps	Krahmd	Cellini	Spencer	Haseltine	La Gravure
1	No	√	√	√	√
2	√	No	No	No	No
3	No	No	No	No	No

Claim 6:

An article of jewelry or a part thereof of a design intricate to the extent of having one or more small projections or depressions made by a process comprising first producing a model of the article to be cast, (1) **then forming about said model a primary mould,** then removing the model from the primary mould, (2) **then introducing into the mould by force sufficient to deposit the material into the depression or depressions of the primary mould, molten wax or other material of low fusing point that will not injure the primary mould to form a pattern,** (3) **and employing the pattern so made for the manufacture of a casting mould.**

Essential Steps	Kralund	Cellini	Spencer	Haseltine	La Gravure
1	No	√	√	√	√
2	√	No	No	No	No
3	No	No	No	No	No